

FINAL REPORT
JANUARY 1998

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REPORT NO. 96-03

BULLPUP
CHEMICAL OVERPACK
CONTAINER EVALUATION

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U.S. Army Chemical and Biological
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ATTN: AMSCB-CMO
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VALIDATION ENGINEERING DIVISION
SAVANNA, ILLINOIS 61074-9639

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<p>The U. S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SIOAC-DEV), was tasked by the U.S. Army Chemical and Biological Defense Command (CBDCOM) to perform an engineering evaluation on the BULLPUP chemical overpack container. It was found that the proposed container modifications and 200 in-lbs of torque applied to the Tee-bolts produce a container with adequate leak integrity. This report contains the results of this evaluation.</p>			
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U.S. ARMY DEFENSE AMMUNITION CENTER
VALIDATION ENGINEERING DIVISION
SAVANNA, IL 61074-9639

REPORT NO. 96-03

BULLPUP CHEMICAL OVERPACK CONTAINER EVALUATION

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PART 1

INTRODUCTION

A. BACKGROUND. The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SIOAC-DEV), was tasked by U.S. Army Chemical and Biological Defense Command (CBDCOM) to perform an engineering evaluation on the BULLPUP chemical overpack container.

B. AUTHORITY. This test was conducted IAW mission responsibilities delegated by the U.S. Army Armament Munitions and Chemical Command (AMCCOM), Rock Island, IL.

C. OBJECTIVE. The objective of the engineering evaluation was to determine the torque required to provide an adequate closure seal between the BULLPUP body and lid. It must be verified that the Tee-bolts currently used are capable of withstanding the necessary torque and that the amount of torque applied to the Tee-bolts does not damage the container flange. Additionally, testing was conducted to ascertain proposed modifications could be administered without disrupting the leak integrity of the container.

D. CONCLUSION. The humidity indicator cover and the breather valve with a butyl rubber gasket and butyl adhesive sealant on the threads provides an adequate seal. A solid plug with a butyl rubber gasket and butyl adhesive sealant on the threads in place of the breather valve or the humidity indicator cover also provides an adequate seal. An adequate closure seal along the container body and lid was obtained with 200 in-lbs of applied torque to each Tee-bolt. The current Tee-bolts are capable of withstanding the 200 in-lbs of torque. At this torque, no damage to the container flange was noted.

E. RECOMMENDATIONS. The Tee-bolts currently utilized should be tightened to a torque of 200 +/- 5 in-lbs. The humidity indicator or the breather valve can be replaced by a plug in

combination with a butyl rubber gasket and butyl rubber sealant torqued to 350 in-lbs. Upon assembly of the container, a pressure decay test should be performed to verify its leak integrity.

PART 2

OCTOBER - NOVEMBER 1997

ATTENDEES

Bradley J. Haas	Director
Mechanical Engineer	U.S. Army Defense Ammunition Center
DSN 585-8336	ATTN: SIOAC-DEV
815-273-8336	3700 Army Depot Road
	Savanna, IL 61074-9639

PART 3

TEST EQUIPMENT

A. BULLPUP Container No. 1:

1. Diameter:	25.5 inches
2. Length:	71 inches
3. Date of Manufacture:	July 1980
4. Status of Container:	Serviceable

B. BULLPUP Container No. 2:

1. Diameter:	25.5 inches
2. Length:	71 inches
3. Date of Manufacture:	June 1980
4. Status of Container:	Non-serviceable

C. Mass Spectrometer:

1. Manufacturer:	Leybold Inc.
2. Date of Manufacture:	1997
3. Model:	UL 200
4. Serial Number:	14100D9711 00065

D. Torqometer:

1. Manufacturer:	Snap-on Tools Corp
2. Date of Manufacture:	February 1978
3. Identification Number:	1846
4. Effective Length:	12 inches
5. Range:	0-600 in-lbs

E. Butyl Sealant:

1. Manufacturer:	Tremco
2. Specification:	U.S. TT-S 001657
3. Color:	Black
4. Tremco Product Number:	982-802

F. Pipe Sealant with Teflon:

1. Manufacture:	Hernon Manufacturing Inc.
2. Product Name:	Dripstop 920

G. Hex Bushing:

1. Supplier:	McMaster Carr Supply Company
2. Part Number:	4638K641
3. Size:	3/4" X 1/8"
4. Material:	Standard Black Pipe
5. Catalog Number:	102

H. Hex Head Pipe Plug:

1. Supplier:	Cajon Precision Pipe Fitting
2. Part Number:	3/4-12-P
3. Material:	Brass

PART 4

TEST SETUP

At one time, pressure-decay leak testing was the prevalent method of leak testing performed on chemical overpack containers. The pressure-decay test is capable of detecting leaks in the range of 1×10^{-2} cc/he/sec/atm. As time has progressed, helium-leak testing has become more feasible. Helium-leak tests are capable of detecting smaller leaks than pressure-decay leak testing. Mass spectrometers are capable of detecting leaks of 1×10^{-8} cc/he/sec/atm and beyond. Previous helium-leak tests on various serviceable stockpile chemical overpack containers have shown leak rates ranging from 1×10^{-5} cc/he/sec/atm to 1×10^{-8} cc/he/sec/atm (reference SIOAC-DEV Report No. 94-10). Portable equipment that will be fielded in the near future is capable of detecting a leak rate of 1×10^{-5} cc/he/sec/atm. For the purpose of this test, a leak rate of 1×10^{-5} cc/he/sec/atm will be considered acceptable.

Two BULLPUP chemical overpack containers were selected for engineering evaluations. The containers were numbered. Container No. 2 was marked "Nonserviceable." Each BULLPUP container arrived with a humidity indicator cover and a breather valve inserted into threaded receptacles. The breather valve was removed and replaced with 3/4-inch to 1/8-inch hex bushing equipped with a shraeder valve. An adequate seal around these receptacles must exist prior to further testing, otherwise escaping gases may provide false readings at other critical locations. The container lid was removed and the gasket was cleaned and properly positioned prior to the lid being placed back on the container. No silicone or talcum powder was applied to the gasket. A Tee-bolt was placed in each slot in the flange. Each bolt was tightened to the specified torque in the order specified by the optional sequence of AMCCOM DMWR 3-1325-E388-P1. This order is displayed on page 7-2 in the Appendix. Helium (5 psi) was inserted into the container. The sniffer probe of the mass spectrometer was used to check the leak integrity of the container. The probe was moved along each seam and around the plugs

inserted in the humidity indicator and breather valve holes. Increased torque was applied to the Tee-bolts in increments with the leak integrity checked following each increment. Following each leak test iteration, a visual inspection of the flange was performed to ascertain no permanent deformation resulted from the torque applied to the Tee-bolts. This procedure was applied to each container.

The torque applied to the Tee-bolts resulting in failure is determined by applying increasing torque to a bolt until it failed. The applied torque was monitored with a torque wrench and maximum applied torque was recorded.

PART 5

TEST RESULTS

A visual inspection of the two BULLPUP containers was performed prior to testing. Container No. 1 was marked "Serviceable." It appeared to be in generally good condition. Small indentations existed in the flange, apparently caused by excessive torque applied to the Tee-bolts. Container No. 2 was marked "Nonserviceable." The flange had also been damaged, apparently from excessive force applied to the Tee-bolts during previous use.

Two pipe-threaded receptacles were inside each container at the location of the humidity indicator and the breather valve. A humidity indicator cover (a threaded hex head cover [see photo on page 6-3]) was threaded into one of the receptacles and the breather valve in the other receptacle in each container upon delivery. The threads of the humidity indicator cover that was shipped with the container was covered with Loc-tite and reinserted. A 3/4- to 1/8-inch hex bushing was coated with Loc-tite and inserted into the other receptacle. The threads of a shraeder valve were coated with pipe sealant with Teflon and inserted into the 1/8-inch hole of the reducer. The container was pressurized. A severe leak developed at the threads of the humidity indicator cover and the reducer. The humidity indicator cover and the reducer were removed and cleaned. A 1/8-inch-thick butyl rubber gasket with a 1-inch inner diameter and a 1-7/16-inch outer diameter was placed over the threads of each. In accordance with AMCCOM DMWR 3-1325-E388-P1, these gaskets can be fabricated to the dimensions of the original gasket out of a butyl rubber sheet. A sketch of this gasket is included in the appendix on page 7-3. Butyl adhesive sealant was applied to the threads of the humidity indicator cover and the reducer and each was reinstalled to a torque of 350 +/- 15 in-lbs (see photo on page 6-4). After 24 hours of curing time, the container was pressurized again. No leaks existed at either receptacle or the shraeder valve. The humidity indicator was then replaced with a 3/4-inch hex head plug. Again, a butyl rubber gasket was placed over the threads and butyl adhesive sealant was placed on the

threads and torqued to 350 +/- 15 in-lbs. No reduction in the leak integrity of the container occurred.

Container No. 1 was assembled and tested first. A Tee-bolt was placed in each hole in the flange. Each Tee-bolt was initially tightened to a torque of 50 in-lbs. At this torque, no seal was achieved. The torque was increased to 80 in-lbs. The container was pressurized using up to 5 psi of helium. The torque applied to the Tee-bolts was increased at various increments to a maximum of 250 in-lbs. The same procedure was applied to container No. 2. Approximately 15 Tee-bolts were used for both tests due to a shortage of the Tee-bolts. For each container, most of the leaks occurred at the heads of the Tee-bolts. The results of leak testing are shown in Table 1.

TABLE 1: LEAK TEST RESULTS

Applied Torque (In-lbs)	Container No. 1 (Serviceable) Max Leak Rate	Container No. 2 (Nonserviceable) Max Leak Rate
80	1×10^{-3}	No Seal
100	5×10^{-5}	4×10^{-3}
120	3×10^{-5}	2×10^{-3}
130	2×10^{-5}	8×10^{-4}
150	2×10^{-5}	4×10^{-4}
200	4×10^{-6}	3×10^{-4}
250	2×10^{-6}	2×10^{-4}

Leak rate values in cc/he/sec/atm

The maximum acceptable leak rate is 1×10^{-5} cc/he/sec/atm. The nonserviceable container No. 2 never reached this level of leak integrity (failed). Container No. 1 reached this leak integrity (passed) with 200 in-lbs of torque applied to the Tee-bolts.

During previous testing, every Tee-bolt had been taken to a torque of 250 in-lbs with no failures occurring. To determine the torque at which the currently utilized Tee-bolts fail, a torque test was applied to three Tee-bolts. Increasing torque was applied to each Tee-bolt until

failure occurred. The minimum torque required to cause failure for any of the three bolts tested was 300 in-lbs. Table 2 displays the required torque to cause failure of each bolt.

TABLE 2: TORQUE REQUIRED FOR FAILURE

Tee-bolt No.	Torque (In-lbs)
1	300
2	310
3	300

As previously stated, each BULLPUP container has small indentations in the flange caused by excessive torque applied to Tee-bolts during previous applications. The indentations existing in the flange prior to the testing made it difficult to determine the exact torque that resulted in permanent deformation of the flange. At 200 in-lbs, visual inspection did not identify any permanent deformation to the flange of the containers. A torque of 250 in-lbs appeared to cause minimal permanent deformation of the flange. At 300 in-lbs, permanent indentations occurring in the flange were easily identified.

PART 6

PHOTOGRAPHS

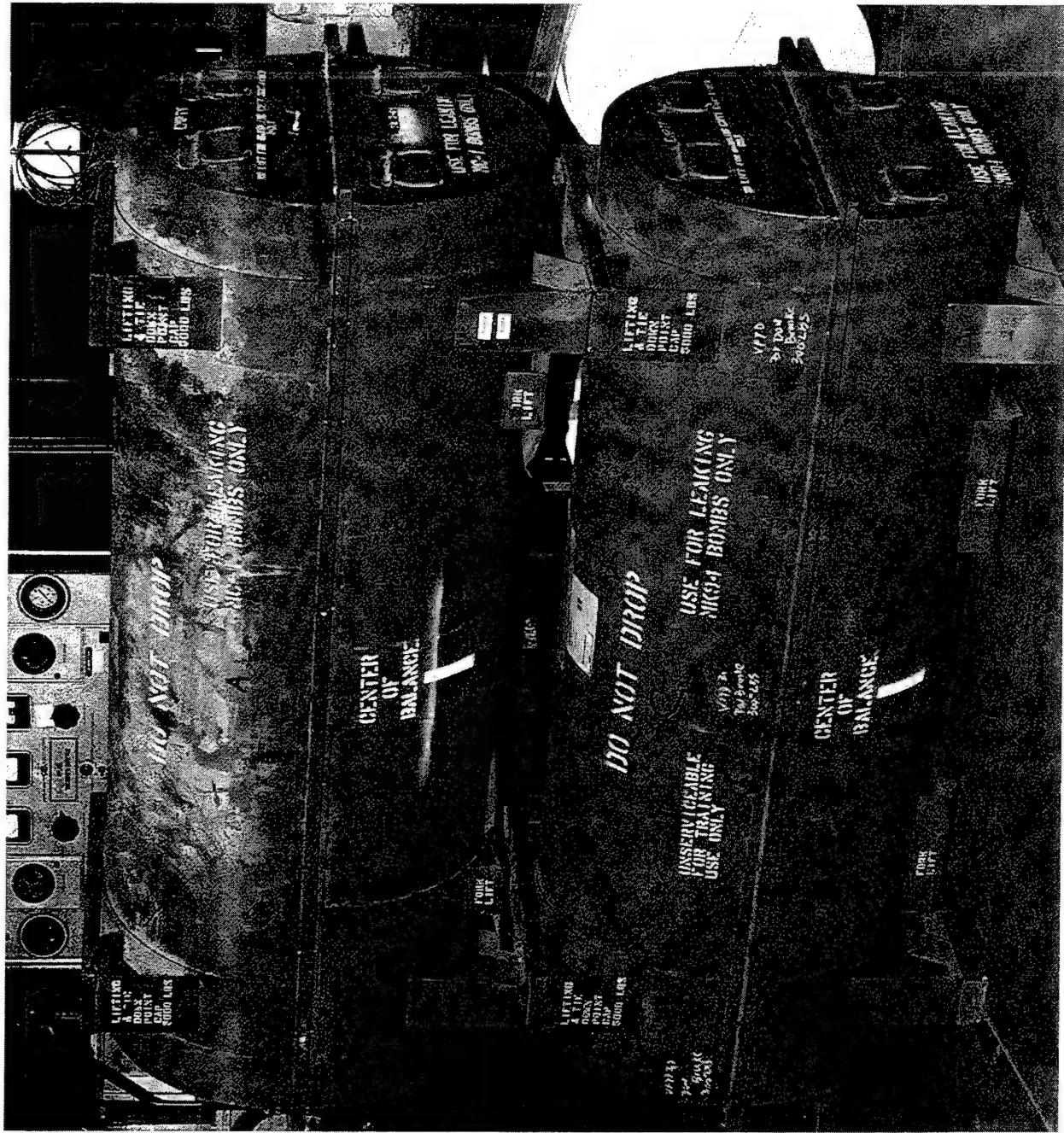


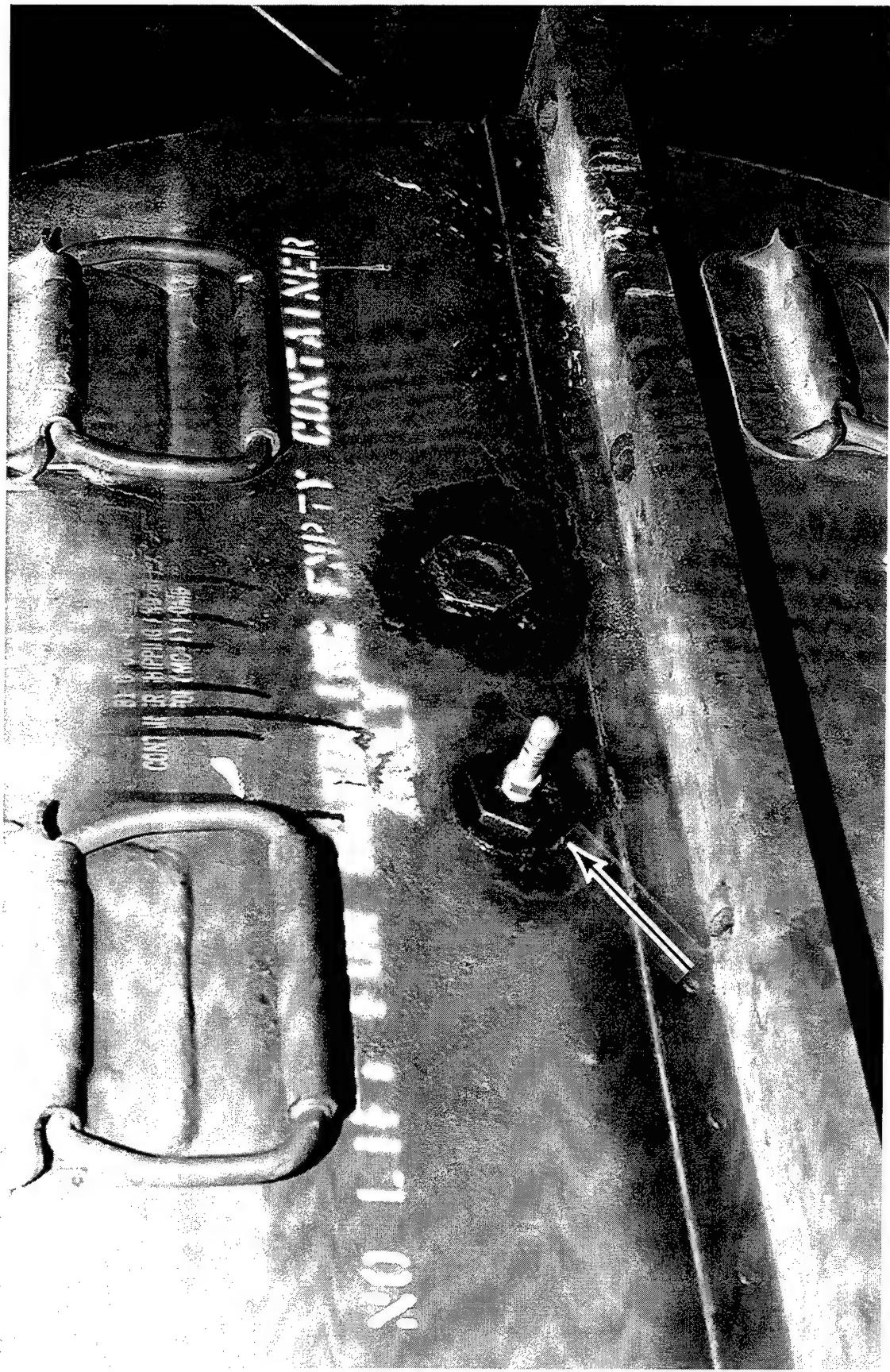
PHOTO NO. A0317-SCN98-DEVOVPK01.TIF. This photo shows an overview of the two BULLPUP containers used in the evaluation.

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PHOTO NO. A0317-SCN98-DEVOVPK8.TIF. The arrow indicates the humidity indicator cover. A butyl rubber washer is placed over the threads. Butyl rubber sealant was also placed on the threads prior to installation.



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PHOTO NO. A0317-SCN98-DEVOVPK8.TIF. The arrow indicates a threaded plug with a shraeder valve installed. The plug had a butyl rubber washer and butyl rubber sealant placed on it prior to installation. The shraeder valve threads were covered with thread sealant with Teflon prior to installation.

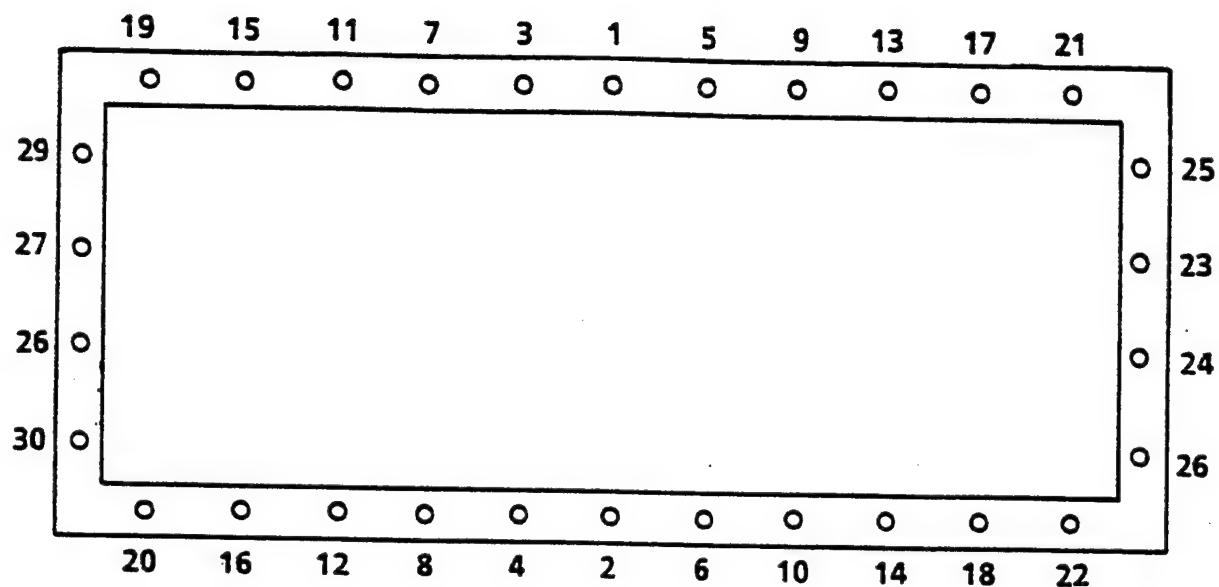


U.S. ARMY DEFENSE AMMUNITION CENTER - SAVANNA, IL

PHOTO NO. A0317-SCN98-DEVOVPK7.TIF. This photo shows the indentation in the container flange resulting from excessive torque applied to the Tee-bolts.

PART 7

APPENDIX



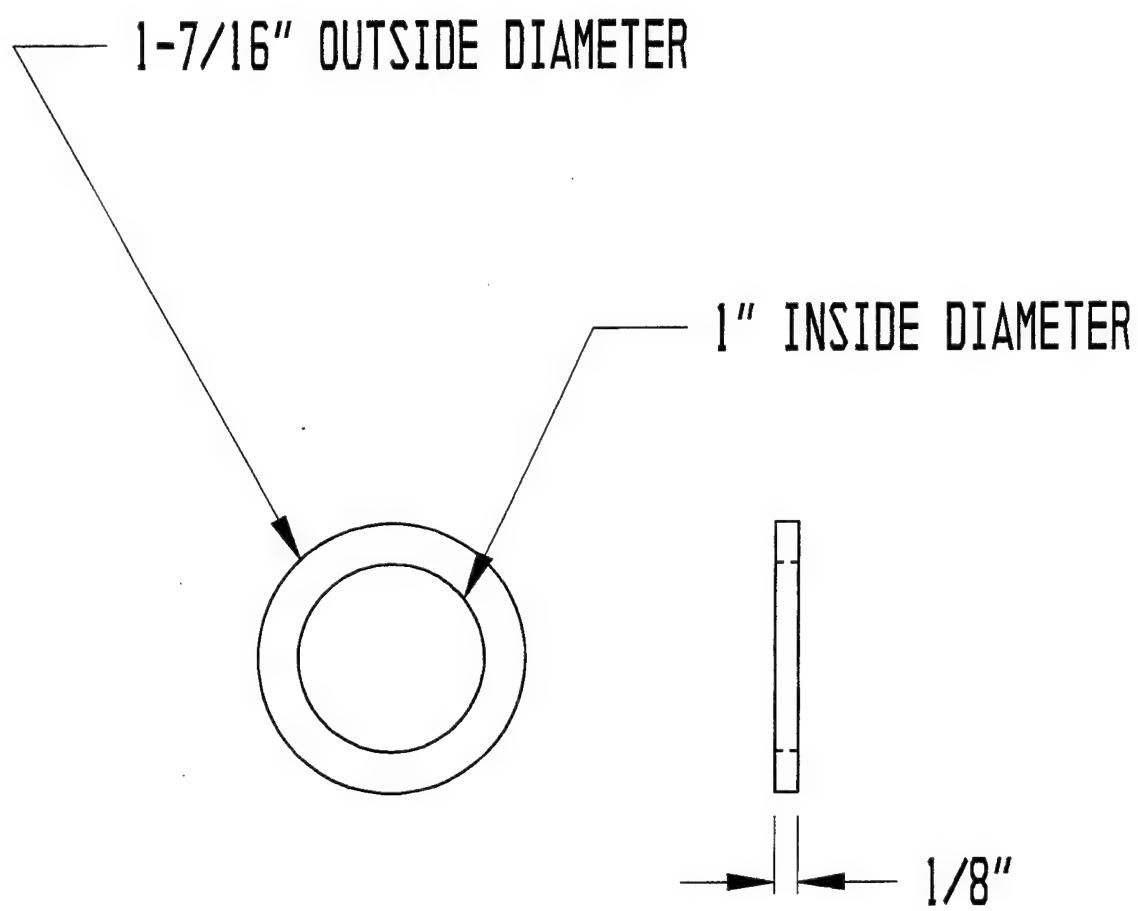
TEE BOLTS MAY BE TIGHTENED BY GOING AROUND THE CONTAINER
IN EITHER DIRECTION, OR BY THE TORQUING SEQUENCE ILLUSTRATED
ABOVE.

ARD-85-1816

Figure 2-9. Optional tee bolt torquing sequence.

2-59 (2-60 blank)

BUTYL RUBBER GASKET



HERNON MANUFACTURING
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(407) 322-4000
FAX: (407) 321-9700
For Emergency 1-800-255-3924

MATERIAL SAFETY DATA SHEET

Page 1 of 4

I. PRODUCT IDENTIFICATION

Product Name: Dripstop 920
Product Type: Pipe Sealant with Teflon

II. COMPOSITION

Ingredients	%
Bisphenol A fumarate resin	25-30
Mica	15-20
Polyglycol Dimethacrylate	10-15
Polyglycol dicotanoate	10-15
Poly (tetrafluoroethylene)	5-10
Silica, amorphous, treated	3-5
Cumene hydroperoxide*	1-3
Titanium Dioxide	1-3

*This component is listed as a SARA Section 313 Toxic Chemical

III. CHEMICAL AND PHYSICAL PROPERTIES

Vapor Pressure:	Less than 10mm at 80° F (27° C)
Vapor Density	Not Available
Solubility in Water:	Slight
Specific Gravity:	1.21 at 80° F (27° C)
Boiling Point:	More than 300° F (149° C)
Volatile Organic Compound (EPA Method 24)	2.07%
Evaporation Rate (Ether = 1)	Not available
pH:	Does not apply
Appearance:	White paste
Odor:	Mild

IV. FLAMMABILITY AND EXPLOSIVE PROPERTIES

Flash Point:	More than 200° F (93° C)	Method: Tag Closed Cup
Estimated NFPA Code:		
Health Hazard:	1	
Fire Hazard:	1	
Reactivity Hazard:	1	
Specific Hazard:	Does not apply	
Estimated HMIS Code:		
Health Hazard:	1	
Flammability Hazard:	1	
Reactivity Hazard:	1	
Personal Protection:	See Section X	
Explosive Limits:		
(% by volume in air) Lower	Approximately 1% Octanol	
(% by volume in air) Upper	Approximately 8% Octanol	
Recommended Extinguishing Agents:	Carbon dioxide, foam, dry chemical	
Hazardous Products Formed by Fire		
or Thermal Decomposition:	Toxic fluorides	
Unusual Fire or Explosion Hazards:	None	
Compressed Gases:	None	
Pressure at Room Temperature:	Does not apply	

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MATERIAL SAFETY DATA SHEET

Page 2 of 4

Product Name: Dristop 920
Product Type: Pipe Sealant with Teflon

V. SPILL OR LEAK AND DISPOSAL PROCEDURES

Steps to be taken in case of spill or leak: Soak up in an inert absorbent. Store in partly filled, closed container until disposal.

Recommended methods of disposal: Incinerate following EPA and local regulations.

VI. STORAGE AND HANDLING PROCEDURES

Safe Storage: Store below 75° F (24° C) to preserve shelf life.
Handling: Avoid prolonged skin contact. Keep away from eyes. Do not use without adequate ventilation.

VII. SHIPPING REGULATIONS

DOT (49 CFR 172)

Domestic Ground Transport

Proper Shipping Name: Unrestricted
Hazard Class or Division: Unrestricted
Identification Number: None

IATA

Proper Shipping Name: Unrestricted
Class or Division: Unrestricted
UN of ID Number: None

IMO

Substance
Marine Pollutant Status: Not Available
Class
Subsidiary Risk label
IMDG Code Page
UN Number: Not Available

VIII. REACTIVITY DATA

Stability: Stable
Hazardous Polymerization: Will not occur
Hazardous Decomposition Products (non-thermal): None
Incompatibility: None

IX. EMERGENCY TREATMENT PROCEDURES

Ingestion: Do not induce vomiting. Keep individual calm. Obtain Medical attention.
Inhalation: Remove to fresh air. If symptoms persist, obtain medical attention.
Skin Contact: Flush with water.
Eye Contact: Flush at least 15 minutes with water. Obtain medical attention.

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MATERIAL SAFETY DATA SHEET

Page 3 of 4

Product Name:
 Product Type:

Dripstop 920
 Pipe Sealant with Teflon

X. PERSONAL PROTECTION

Eyes: Safety glasses or goggles.
 Skin: Rubber or plastic gloves.
 Ventilation: Local ventilation recommended for prolonged use.

XI. Health Hazard

Toxicity: Eye irritant. Est. Oral LD50 >10,000 mg/kg.
 Est. Dermal LD50 > 5,000 mg/kg.

Primary Routes of Entry: None Known
 Signs and Symptoms of Exposure: Intoxication, nausea, headache, dizziness. May cause dermatitis on prolonged contact
 Existing Conditions Aggravated by Exposure: None known.

Exposure Limits (TWA)
 Ingredients

Bisphenol A fumarate resin
 Mica

Polyglycol Dimethacrylate
 Polyglycol dioctanoate
 Poly (tetrafluoroethylene)
 Silica, amorphous, treated
 Cumene hydroperoxide
 Titanium Dioxide

	ACGIH (TLV)	OSHA (PEL)	OTHER
Bisphenol A fumarate resin	None	None	None
Mica	3 mg/m ³ TWA respirable dust	3 mg/m ³ TWA respirable dust	None
Polyglycol Dimethacrylate	None	None	None
Polyglycol dioctanoate	None	None	None
Poly (tetrafluoroethylene)	None	None	None
Silica, amorphous, treated	10 mg/m ³ TWA	6 mg/m ³ TWA	None
Cumene hydroperoxide	None	None	None
Titanium Dioxide	10 mg/m ³ dust	10 mg/m ³ dust	None

Ingredients

Bisphenol A fumarate resin
 Mica
 Polyglycol Dimethacrylate
 Polyglycol dictanoate
 Poly (tetrafluoroethylene)
 Silica, amorphous, treated
 Cumene hydroperoxide
 Titanium Dioxide

Literature Referenced
 Target Organ and Other Health Effects

	Carcinogen	NTP	ARC	OSHA
	NO	NO	NO	NO
	NO	NO	NO	NO
	NO	NO	NO	NO
	NO	NO	NO	NO
	NO	NO	NO	NO
	NO	N/A	NO	NO
	NO	NO	NO	NO
	NO	NO	NO	NO
	NO	NO	NO	NO
	NO	NO	NO	NO

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MATERIAL SAFETY DATA SHEET

Page 4 of 4

Abbreviations

LUN Lung
SOM Evidence of some Carcinogenicity
MUT Mutagen

IRR Irritant
ALG Allergen

XII. PREPARATION INFORMATION

Prepared by:

Josef Arnon

Title:

Technical Director

Company:

Hermon Manufacturing, 121 Tech Drive, Sanford, FL 32771

Phone:

(407) 322-4000

Emergency:

1-800-255-3924

Revision:

07/96

12/22/97 13:19.13 FROM: TREMCO

TO: 8811

PAGE

TREMCO

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220 Wicksteed Avenue, Toronto, ON M4H 1G7

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INSTANT DELIVERY

right to your fax machine!

Spec Data & MSDS

Sealants
Waterproofing
Firestopping
Glazing



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P.O. BOX 228068
BEACHWOOD, OHIO 44122-8068

MATERIAL SAFETY DATA SHEET
TELEPHONE: (216) 292-5000

EMERGENCIES: (216) 765-6727 8:30-5:00 EST
AFTER HOURS: CHEMTRAC (800) 424-9300

SECTION I

Product Name: TREMCO BUTYL SEALANT
Chemical Family: Sealant
Product Code: 982-8XX
MSDS Preparer: C.R.Bruno

Date Prepared: 12-APR-96
Replaces Date: N/A

Other Applications:

THIS MATERIAL SAFETY DATA SHEET (MSDS) APPLIES TO THE FOLLOWING:
982-801(BRONZE), 982-802(BLACK),
982-806(WHITE), 982-851(ALUMINUM STONE)

Section 2 - Molecular Composition

Common Name and Chemical Name Exposure Limits		Weight %	CAS Number
CALCIUM CARBONATE (LIMESTONE)		50.0-60.0	1317-65-3
OSHA:TWA 15 mg/M3 STEL -	(total dust, 5mg/M3 respirable fraction)		
ACGIH:TWA 10 mg/M3 STEL -	(total dust, no asbestos, <1% SiO2)		
POLYBUTENE		10.0-15.0	9003-28-5
OSHA:TWA - STEL -			
ACGIH:TWA - STEL -			
STOIDDARD SOLVENT (MINERAL SPIRITS)		10.0-15.0	8052-41-3
OSHA:TWA 100 ppm STEL -			
ACGIH:TWA 100 ppm STEL -			
TALC ((Mg3H2)((SiO3)4) (HYDROUS MAGNESIUM SILICATE)		1.0-5.0	14807-96-6
OSHA:TWA 2.00 mg/M3 STEL -	(respirable dust, no asbestos, <1% SiO2)		
ACGIH:TWA 2.00 mg/M3 STEL -	(respirable dust, no asbestos)		
XYLEMES (DIMETHYLBENZENES)		1.0-5.0	1330-20-7
OSHA:TWA 100 ppm STEL 150 ppm			
ACGIH:TWA 100 ppm STEL 150 ppm			
HYDROCARBON RESIN		0.5-2.0	68478-07-9
OSHA:TWA 15 mg/M3 STEL -	(total dust)		
ACGIH:TWA 10 mg/M3 STEL -	(total dust)		
CRYSTALLINE SILICA (QUARTZ)		0.5-2.0	14808-60-7
OSHA:TWA 0.10 mg/M3 STEL -	(skin) (respirable dust)		
ACGIH:TWA 0.10 mg/M3 STEL -	(respirable dust)		
TITANIUM DIOXIDE		0.0-2.0	13463-67-7
OSHA:TWA 10 mg/M3 STEL -			
ACGIH:TWA 10 mg/M3 STEL -	(total dust, no asbestos, <1% SiO2)		
ETHYL BENZENE		0.1-1.0	100-41-4
OSHA:TWA 100 ppm STEL 125 ppm			
ACGIH:TWA 100 ppm STEL 125 ppm			
CASTOR OIL, MODIFIED		0.0-2.0	8001-78-3
OSHA:TWA 15 mg/M3 STEL -	(total nuisance dust)		
ACGIH:TWA 10 mg/M3 STEL -	(total nuisance dust)		
CARBON BLACK		0.0-1.0	1333-86-4
OSHA:TWA 3.50 mg/M3 STEL -			
ACGIH:TWA 3.50 mg/M3 STEL -			

Section 3 - Hazards Identification

Emergency Overview:

Various colored paste. May cause respiratory irritation, vertigo, nausea, narcotic effects, liver effects, jaundice, and other central nervous system effects including death. Leave area to breathe fresh air. Avoid further overexposure. If symptoms persist, get medical attention immediately.

Potential Hlth Effect/Rte of Entry:

Inhalation:

May cause respiratory irritation, vertigo, headache, nausea, narcotic effects, liver effects, jaundice, and other central nervous system effects including unconsciousness and death.

Eyes:

May cause eye irritation.

Ingestion:

May cause mouth, esophageal, and gastrointestinal irritation, and narcotic and CNS effects. Aspiration into the lungs during swallowing or vomiting can cause lung irritation and damage and can be fatal.

Skin:

May cause defatting, irritation, dermatitis, burns, and liver effects and jaundice if absorbed at concentrations associated with nausea.

Aggravated Medical Conditions:

Preexisting eye, skin, respiratory, and liver disorders may be aggravated by exposure.

Acute Health Effects:

See effects described above.

Chronic Health Effects:

Prolonged or repeated exposure to stoddard solvent may cause the defatting, irritation, dermatitis, narcotic and CNS effects described above, liver effects, and jaundice. Kidney and lung effects have been noted in some animal species. Prolonged or repeated contact/exposure to xylene and ethyl benzene may cause defatting, drying, and irritation of the skin, dermatitis, CNS effects described above, heart muscle sensitization and arrhythmia, hearing loss, and brain, liver, and kidney damage. Ethyl benzene may also cause testes damage. Fillers are encapsulated and are not expected to be released in product under normal conditions of use. Prolonged and repeated exposure to excessive airborne concentrations of talc can result in scarring of the lungs (pneumoconiosis) or the covering of the lungs (pleural thickening). No serious health effects have been established in man when exposed to carbon black. Inflammation, lung fibrosis, and tumors have been observed in animals which overload lung clearance mechanisms. Carbon black contains varying amounts of polynuclear aromatic compounds(PNA's) which have been found to cause cancer. Crystalline silica(quartz) may cause cancer, but only limited evidence in humans. Prolonged and repeated overexposure to free crystalline silica dust above the TLV level may cause scarring of the

lungs with cough and shortness of breath. A delayed lung injury, silicosis may result from breathing free silica.

Section 4 - First Aid Measures

Inhalation:

Leave area to breathe fresh air. Avoid further overexposure. If symptoms persist, get medical attention immediately.

Eyes:

Flush immediately with running water for 15 minutes, lifting the upper and lower lids occasionally. Get medical attention immediately.

Ingestion:

Get medical attention immediately.

Skin:

Wash area of contact thoroughly with hand cleaner followed by soap and water. If irritation, rash or other disorders develop, get medical attention immediately.

Notes to Physician:

N/A

Section 5 - Fire Fighting Measures

Flash Point: N/A

Method: N/A

Lower Flammability Limit: Not Established

Upper Flammability Limit: Not Established

Autoignition Temperature: Not Established

Extinguishing Media:

If water fog is ineffective, use carbon dioxide, dry chemical or foam.

Fire and Explosion Hazards:

Never use welding or cutting torch on or near container (even empty).

Product, residue or vapor may ignite. See section IX for additional precautions.

Special Fire Fighting Procedures:

During a fire, personnel at the scene are to prevent exposure to fumes using accepted fire fighting techniques.

Fire Fighting Equipment: N/A

Other Precautions:

Not Applicable

Section 6 - Accidental Release Measures

Release Response Overview:

Remove sources of ignition immediately. Ventilate to reduce the airborne contaminant concentration below the exposure limit in Section II of the MSDS. Absorb spill in sand, earth or other suitable material. Transfer to appropriate container for disposal.

Section 7 - Handling and Storage**Handling and Storage Precautions:**

Store under normal warehouse conditions below 80F. Prevent inhalation of vapor, ingestion, and contact with skin and eyes. Keep container closed when not in use. Precautions also apply to emptied containers. Change soiled workclothes frequently. Clean hands thoroughly after handling.

Section 8 - Exposure Controls/Personal Protection**Respiratory:**

Wear appropriate, properly fitted NIOSH/MSHA approved respirator when the airborne contaminant level(s) exceed the exposure limits indicated on the MSDS. Follow respirator manufacturer's directions for respirator use.

Skin:

Protect hands with impervious rubber gloves and wear typical full cover clothing. Prevent contact with skin. Gloves must be checked before each use for signs of degradation and penetration and for proper functioning.

Eyes:

Wear suitable safety eyewear.

Face:

Not required.

Engineering:

Use local exhaust when the general ventilation is not sufficient to keep the airborne contaminant concentration below the exposure limit in Section II of the MSDS.

Section 9 - Physical and Chemical Properties

Odor/Appearance:	SOLVENT/VARIOUS COLORED PASTES
Color:	VARIOUS
Physical State:	Paste
pH:	N/A
Vapor Pressure:	Not Establ.
Vapor Density:	>1
Boiling Point:	N/A
Melting Point:	N/A
Freezing Point:	N/A
Solubility in Water:	Negligible
Specific Gravity:	1.46
% Volatile Weight:	16.26

Section 10 - Reactivity/Stability

Stability:
Stable

Incompatible Products:

Avoid contact with strong oxidizing agents.

Conditions to Avoid Polymerization:

Hazardous polymerization will not occur.

Section 11 - Toxicological Information

Eyes:	SEE SECTION III
Ingestion:	" " "
Inhalation:	" " "
Skin:	" " "
Subchronic:	" " "
Chronic:	" " "

Section 12 - Ecological Information

Ecotoxicological Data:	N/A
Chemical Fate:	N/A

Section 13 - Disposal Considerations

RCRA Class:	N/A
Disposal Method:	Not regulated by RCRA. Dispose of in compliance with state and local regulations.
EPA Reportable Quantities	

N/A

Section 14 - Transportation Data

DOT Shipping Name: NOT REGULATED
 DOT Hazard Class: NOT APPLICABLE
 DOT Label:
 UN/NA Number: N/A
 Packing Group:
 Special Provisions:
 Packaging
 Exceptions:
 Non-Bulk:
 Bulk:

Quantity Limitations

Passenger Aircraft or Railcar:
 Cargo Aircraft:

Vessel Stowage Requirements

Vessel Stowage:
 Other Stowage:

Transportation Notes: N/A

Section 15 - Regulatory Information

TSCA Status: On the TSCA Inventory
 OSHA Status: Considered hazardous based on the following criteria:
 Irritant
 Sensitizer
 Target Organs

Liver
 Kidney
 Central Nervous System
 Reproductive
 Lung
 Skin
 Eye
 Heart
 Testes
 Ear

OSHA Hazardous Components

	CAS Number
CALCIUM CARBONATE (LIMESTONE)	1317-65-3
* CRYSTALLINE SILICA (QUARTZ)	14808-60-7
TALC (Mg3H2)(SiO3)4 (HYDROUS MAGNESIUM SILICATE)	14807-96-6
CARBON BLACK	1333-86-4
TITANIUM DIOXIDE	13463-67-7
ETHYL BENZENE	100-41-4
STODDARD SOLVENT (MINERAL SPIRITS)	8052-41-3
XYLEMES (DIMETHYLBENZENES)	1330-20-7

* - CHEMICAL IS LISTED AS AN IARC, NTP, OSHA, OR ACGIH CARCINOGEN

Compliance Quantities**No Compliance Quantities****SARA 311 Ratings**

Immediate Health Hazard:	Y
Delayed Health Hazard:	Y
Fire Hazard:	Y
Reactivity Hazard:	N
Sudden Release of Pressure Hazard:	N

SARA 313 Ingredients**CAS Number**

ETHYL BENZENE	100-41-4
XYLEMES (DIMETHYLBENZENES)	1330-20-7

Proposition 65 Ingredients

Chemicals known to the State of California to cause cancer,
 birth defects and/or other reproductive harm.

CAS Number

CRYSTALLINE SILICA (QUARTZ)	14808-60-7
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Section 16 - Other Information

FOR INDUSTRIAL USE ONLY. KEEP OUT OF REACH OF CHILDREN.
THE HAZARD INFORMATION HEREIN IS OFFERED SOLELY FOR THE CONSIDERATION
OF THE USER, SUBJECT TO HIS OWN INVESTIGATION OF COMPLIANCE WITH APPLICABLE
REGULATIONS, INCLUDING THE SAFE USE OF THE PRODUCT UNDER EVERY FORESEEABLE
CONDITION.